CLAIMS

1. An electronic assembly comprising:

a housing member comprising a heat-conductive member;

a substrate supported by the housing member, the substrate having conductors on a surface thereof;

a circuit device mounted to the substrate with solder connections on a first surface of the device that are registered with the conductors on the substrate, the device having a second surface oppositely disposed from the first surface; and

a solder joint consisting essentially of indium and optionally one or more alloying constituents that increase the melting temperature of the solder joint above that of indium, the solder joint bonding the second surface of the device to the heat-conductive member.

2. The electronic assembly according to claim 1, wherein the solder joint consists essentially of indium.

3. The electronic assembly according to claim 1, wherein the solder joint comprises indium and at least one of gold and silver in an amount of up to 0.5 weight percent.

4. The electronic assembly according to claim 1, wherein the solder joint comprising indium and at least one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of up to 0.5 weight percent.

5. The electronic assembly according to claim 1, wherein the solder joint consists essentially of indium, at least one of gold and silver in an amount of up to 0.5 weight percent, and at least one of nickel, nickel-gold alloy, tin and tin alloy in an amount of up to 0.5 weight percent.

6. The electronic assembly according to claim 1, wherein a thermally-conductive lubricant is not present between the second surface of the device and the heat-conductive member.

7. The electronic assembly according to claim 1, further comprising an overmold compound that encapsulates the substrate and the device on the housing member.

8. The electronic assembly according to claim 1, further comprising a cover member that, with the housing member, encloses the substrate and the device.

9. The electronic assembly according to claim 8, wherein an overmold compound does not encapsulate the substrate and the device.

10. The electronic assembly according to claim 1, wherein the heat-conductive member is a pedestal protruding from the housing member.

11. The electronic assembly according to claim 1, wherein a portion of the housing member defines the heat-conductive member.

12. The electronic assembly according to claim 1, wherein the assembly lacks any biasing means that contacts a surface of the substrate opposite the device and urges the device into contact with the heat-conductive member.

13. An electronic assembly comprising:

a housing having an interior region;

a heat-conductive pedestal projecting into the interior region of the housing;

a laminate substrate within the interior region of the housing and supported by the housing, the substrate having conductors on a surface thereof;

a flip-chip device mounted to the substrate with solder connections on a first surface of the flip-chip device that are registered with the conductors on the substrate, the flip-chip device having a second surface oppositely disposed from the first surface; and

a solder joint consisting essentially of indium and at least one alloy constituent that increases the melting temperature of the solder joint above that of indium, the solder joint bonding the second surface of the flip-chip device to the heat-conductive pedestal;

wherein a thermally-conductive lubricant is not present between the second surface of the flip-chip device and the heat-conductive member.

14. The electronic assembly according to claim 13, wherein the solder joint contains gold or silver in an amount of about 0.1 to about 0.5 weight percent.

15. The electronic assembly according to claim 13, wherein the solder joint contains one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of about 0.1 to about 0.5 weight percent.

16. The electronic assembly according to claim 13, wherein the solder joint consists essentially of indium, at least one of gold and silver in an amount of about 0.1 to 0.5 weight percent, and at least one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of about 0.1 to 0.5 weight

percent.

17. The electronic assembly according to claim 13, further comprising an overmold compound that encapsulates the substrate and the flip-chip device within the housing and underfills the flip-chip device.

18. The electronic assembly according to claim 13, wherein the housing comprising a base member and a cover member that enclose the substrate and the flip-chip device.

19. The electronic assembly according to claim 18, wherein an overmold compound does not encapsulate the substrate and the flip-chip device.

20. The electronic assembly according to claim 13, wherein a portion of the housing defines the pedestal.

21. A process of forming an electronic assembly in which a substrate is supported by a housing member having a heat-conductive member, the substrate having conductors on a surface thereof, a circuit device mounted to the substrate with solder connections on a first surface of the device that are registered with the conductors on the substrate, the device having a second surface oppositely disposed from the first surface, the process comprising the step of:

providing a solder material between the second surface of the device and the heat-conductive member; and

reflowing the solder material to form a solder joint consisting essentially of indium and optionally one or more alloying constituents that increase the melting temperature of the solder joint above that of indium, the solder joint bonding the second surface of the device to the heat-conductive member.

22. The process according to claim 21, wherein the solder material and the solder joint consist essentially of indium.

23. The process according to claim 21, wherein the solder material consists essentially of indium and the solder joint contains at least one of gold and silver in an amount of up to 0.5 weight percent, the process further comprising the step of depositing a layer of gold and/or silver on the second surface of the device, the gold and/or silver diffusing into the solder material during the reflowing step.

24. The process according to claim 21, wherein the solder material consists essentially of indium and the solder joint contains at least one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of up to 0.5 weight percent, the process further comprising the step of depositing a layer of at least one of nickel, nickel-gold alloy, tin, and tin alloy on the heat-conductive member, the nickel, nickel-gold alloy, tin, and/or tin alloy diffusing into the

solder material during the reflowing step.

25. The process according to claim 21, wherein the solder material consists essentially of indium and the solder joint consists essentially of indium, gold and/or silver in an amount of up to 0.5 weight percent, and at least one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of up to 0.5 weight percent, the process further comprising the step of depositing a layer of gold and/or silver on the second surface of the device and depositing a layer of at least one of nickel, nickel-gold alloy, tin, and tin alloy on the heat-conductive member, the gold, silver, nickel, nickel-gold alloy, tin, and/or tin alloy diffusing into the solder material during the reflowing step.

26. The process according to claim 21, wherein a thermally-conductive lubricant is not present between the second surface of the device and the heat-conductive member following the reflowing step.

27. The process according to claim 21, further comprising the step of depositing an overmold compound on the substrate so as to overmold the substrate and the device, wherein the overmold compound is cured following the reflowing step.

28. The process according to claim 21, further comprising the step of providing an adhesive between the substrate and the housing member, wherein the adhesive is cured during the reflowing step to bond the substrate to the housing member.

29. The process according to claim 21, further comprising the step of placing a cover member on the housing member so that the cover member and the housing member enclose the substrate and the device.

30. The process according to claim 29, wherein an overmold

compound is not deposited to encapsulate the substrate and the device.

31. The process according to claim 21, further comprising the step of forming the housing member so that a portion thereof defines the heat-conductive member.

32. The process according to claim 21, wherein the assembly lacks any biasing means that contacts a surface of the substrate opposite the device and urges the device into contact with the heat-conductive member.

33. A process of forming an electronic assembly in which a laminate substrate is supported within an interior region of a housing having a heat-conductive member that projects into the interior region of the housing, the substrate having conductors on a surface thereof, a flip-chip device mounted to the substrate with solder connections on a first surface of the flip-chip device that are registered with the conductors on the substrate, the flip-chip device having a second surface oppositely disposed from the first surface, the process comprising the step of:

providing a solder material between the second surface of the flip-chip device and the heat-conductive member, the solder material consisting essentially of indium; and

reflowing the solder material to form a solder joint consisting essentially of indium and at least one alloying constituent that increases the melting temperature of the solder joint above that of indium, the solder joint bonding the second surface of the flip-chip device to the heat-conductive member;

wherein a thermally-conductive lubricant is not present between the second surface of the flip-chip device and the heat-conductive member.

34. The process according to claim 33, wherein the solder material consists essentially of indium and the solder joint contains at least one of gold and silver in an amount of about 0.1 to 0.5 weight percent, the process further comprising the step of depositing a layer of gold and/or silver on the second surface of the flip-chip device, the gold and/or silver diffusing into the solder material during the reflowing step.

35. The process according to claim 33, wherein the solder material consists essentially of indium and the solder joint contains at least one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of about 0.1 to 0.5 weight percent, the process further comprising the step of depositing a layer of

at least one of nickel, nickel-gold alloy, tin, and tin alloy on the heat-conductive member, the nickel, nickel-gold alloy, tin, and/or tin alloy diffusing into the solder material during the reflowing step.

36. The process according to claim 33, wherein the solder material consists essentially of indium and the solder joint consists essentially of indium, gold and/or silver in an amount of about 0.1 to 0.5 weight percent, and at least one of nickel, nickel-gold alloy, tin, and tin alloy in an amount of about 0.1 to 0.5 weight percent, the process further comprising the step of depositing a layer of gold and/or silver on the second surface of the flip-chip device and depositing a layer of at least one of nickel, nickel-gold alloy, tin, and tin alloy on the heat-conductive member, the gold, silver, nickel, nickel-gold alloy, tin, and/or tin alloy diffusing into the solder material during the reflowing step.

37. The process according to claim 33, further comprising the step of depositing an overmold compound on the substrate so as to overmold the substrate and the flip-chip device and underfill the flip-chip device, wherein the overmold compound is cured following the reflowing step.

38. The process according to claim 33, further comprising the step of providing an adhesive between the substrate and the housing, wherein the adhesive is cured during the reflowing step to bond the substrate to the housing.

39. The process according to claim 33, further comprising the step of placing a cover on the housing so that the cover and the housing enclose the substrate and the flip-chip device, wherein an overmold compound is not deposited to encapsulate the substrate and the flip-chip device.

40. The process according to claim 33, further comprising the

step of forming the housing so that a portion thereof defines the heat-conductive member.